Prüfbericht-Nr.: *Test report no.:*	**CN21F0OV 001**	**Auftrags-Nr.:** *Order no.:*	168294786	Seite 1 von 22 *Page 1 of 22*
Kunden-Referenz-Nr.: *Client reference no.:*	N/A	**Auftragsdatum:** *Order date:*	2020-12-07	
Auftraggeber: *Client:*	**Cooper Lighting LLC** 1121 Highway 74 South, Peachtree City, Georgia 30269, United States Of America			
Prüfgegenstand: *Test item:*	In-Wall Smart Switch			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	HIWMAS1BLE40AWH, HIWMAS1BLE40AWH-C			
Auftrags-Inhalt: *Order content:*	FCC and IC approval			
Prüfgrundlage: *Test specification:*	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 CFR47 FCC Part 2.1091		RSS-247 Issue 2 February 2017 RSS-Gen Issue 5 March 2019 RSS-102 Issue 5 March 2015	

Wareneingangsdatum: *Date of sample receipt:*	2020-12-10	Please refer to photo documents
Prüfmuster-Nr.: *Test sample no.:*	A002964799-001 A002964799-002	
Prüfzeitraum: *Testing period:*	2021-01-04 – 2021-01-15	
Ort der Prüfung: *Place of testing:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüfergebnis*: *Test result*:*	Pass	

geprüft von: *tested by:*	X Alex Lan	**genehmigt von:** *authorized by:*	X Winnie Hou
Datum: *Date:* 2021-02-02	Signed by: Alex Lan	**Ausstellungsdatum:** *Issue date:* 2021-02-02	Signed by: Winnie Hou
Stellung / Position	Senior Project Engineer	**Stellung** / Position	Department Manager

Sonstiges / *Other:*

FCC ID: 2AKCY-HIWMAS1BLE40A
IC: 4706A-HIWMASBLE40 HVIN: HIWMAS1BLE40A

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged:*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhalt
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specifications(s)		*F(ail) = failed a.m. test specifications(s)*	*N/A = not applicable*	*N/T = not tested*

Test Summary

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER
RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY
RESULT: Pass

5.1.4 99%DB BANDWIDTH
RESULT: Pass

5.1.5 6DB BANDWIDTH
RESULT: Pass

5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH
RESULT: Pass

5.1.7 RADIATED SPURIOUS EMISSION
RESULT: Pass

5.1.8 CONDUCTED EMISSION ON AC MAINS
RESULT: Pass

6.1.1 ELECTROMAGNETIC FIELDS
RESULT: Pass

Contents

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results of Conducted & Radiated Testing

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China

FCC Registration No.: 694916

IC Registration No.: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing				
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Until**
Wireless Connectivity Tester	Rohde & Schwarz	CMW270	101375	2021-08-30
Signal Analyzer	Rohde & Schwarz	FSV 40	101441	2021-08-30
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
Test Software	Rohde & Schwarz	WMS32 (V10.40.10)	N/A	N/A
Power Meter	Rohde & Schwarz	NRP2	107105	2021-12-20
Wideband Power Sensor	Rohde & Schwarz	NRP-Z81	105350	2021-12-20
Unwanted Emission Testing				
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Until**
Signal Generator	Rohde & Schwarz	SMB100A	180840	2021-08-30
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	165339	2021-08-30
Signal Analyzer	Rohde & Schwarz	FSV 40	101440	2021-08-30
System Controller Interface	Rohde & Schwarz	SCI-100	S10010036	N/A
Filterbank	Rohde & Schwarz	CDMA	100751	2021-08-30
Filterbank	Rohde & Schwarz	GSM	100811	2021-08-30
OSP	Rohde & Schwarz	OSP 120	102041	N/A
OSP	Rohde & Schwarz	OSP 150	101385	N/A
Pre-amplifier	Rohde & Schwarz	SCU08F1	08320030	2021-08-30
Amplifier	Rohde & Schwarz	SCU-18F	180079	2021-08-30
Amplifier	Rohde & Schwarz	SCU40A	100450	2021-09-03
Trilog Broadband Antenna (30 MHz - 1 GHz)	Schwarzbeck	VULB9162	192	2021-09-02
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218719	2021-09-02
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18312	2021-09-02
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19066	2021-09-02
Biconical Broadband Antenna (30 MHz - 1 GHz)	Schwarzbeck	VUBA 9117	357	2021-09-02

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Item		Extended Uncertainty
Conducted Emission		± 2.74 dB
Radiated Emission (30-1000MHz)	Field strength (dBμV/m)	4.27dB
Radiated Emission (above 1000MHz)	Field strength (dBμV/m)	4.46dB
Radio Spectrum		± 1.5 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at East of F/1, F/2 - F/4, Building 1, Cybio Technology Building, No. 6 Langshan No. 2 Road, North Hi-tech Industry Park, Nanshan District, Shenzhen, P.R. China, P. R. China. is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is an In-Wall Smart Switch, it supports Bluetooth Low Energy wireless technology.

Both models are identical except model number for different regions.
Model HIWMAS1BLE40AWH is for United States market and the model HIWMAS1BLE40AWH-C is for Canada market.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	In-Wall Smart Switch
Type Designation	HIWMAS1BLE40AWH, HIWMAS1BLE40AWH-C
FCC ID	2AKCY-HIWMAS1BLE40A
IC	4706A-HIWMASBLE40
HVIN	HIWMAS1BLE40A
Operating Voltage	AC 120V, 60Hz
Testing Voltage	AC 120V, 60Hz
Technical Specification of Bluetooth Low Energy	
Operating Frequency	2402 – 2480 MHz
Bluetooth Core Version	Bluetooth 4.0, single mode
Data rate	1Mbps
Channel Number	40 channels
Channel separation	2MHz
Modulation	GFSK
Antenna Type	IFA Antenna
Smart Antenna Systems:	Not Applicable
Number of Antenna	1
Antenna Gain	1.85 dBi

Table 3: RF Channel and Frequency of Bluetooth Low Energy

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
00	**2402.00**	10	2422.00	20	2442.00	30	2462.00
01	2404.00	11	2424.00	21	2444.00	31	2464.00
02	2406.00	12	2426.00	22	2446.00	32	2466.00
03	2408.00	13	2428.00	23	2448.00	33	2468.00
04	2410.00	14	2430.00	24	2450.00	34	2470.00
05	2412.00	15	2432.00	25	2452.00	35	2472.00
06	2414.00	16	2434.00	26	2454.00	36	2474.00
07	2416.00	17	2436.00	27	2456.00	37	2476.00
08	2418.00	18	2438.00	28	2458.00	38	2478.00
09	2420.00	**19**	**2440.00**	29	2460.00	**39**	**2480.00**

3.3 Independent Operation Modes

The basic operation modes are:

A. On, transmitting mode
    1. Low channel
    2. Middle channel
    3. High channel

B. On, Operating

C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- Block Diagram
- FCC/IC Label and Location Info
- Operation Description
- Photo Document
- Schematics
- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all test items were applied on model HIWMAS1BLE40AWH.

4.3 Special Accessories and Auxiliary Equipment

Table 4: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Notebook	Lenovo	ThinkPad X260	N/A

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

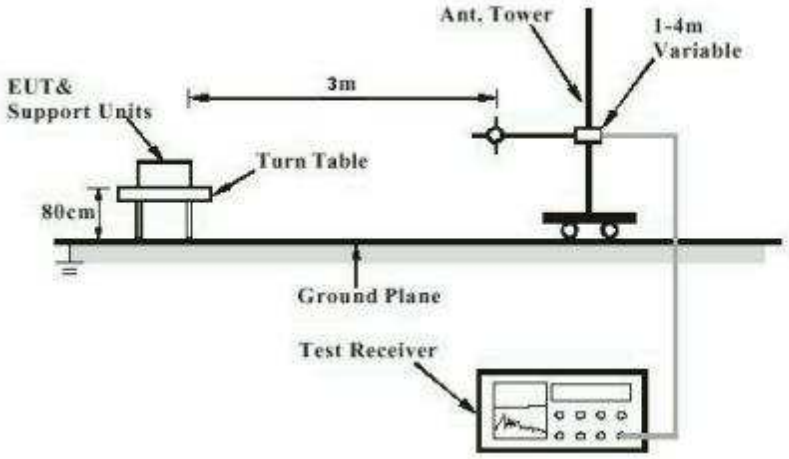


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

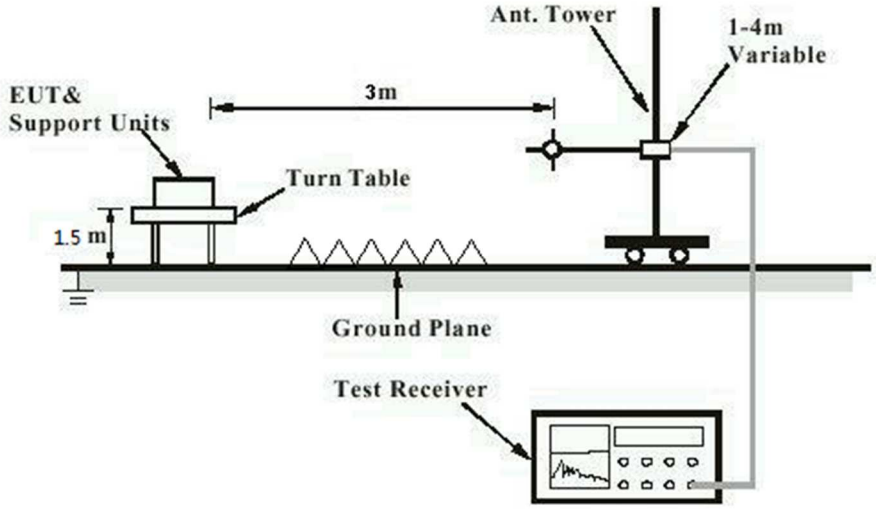


Diagram of Measurement Configuration for Mains Conduction Measurement

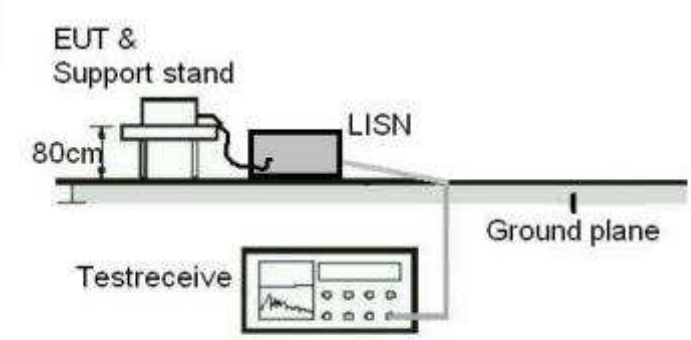
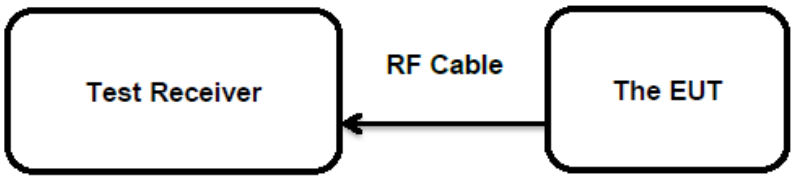


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(b)(4) and Part 15.203 RSS-Gen Clause 6.7
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 1.85 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Peak Conducted Output Power

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(b)(3) RSS-247 Clause 5.4(d)
Basic standard	:	ANSI C63.10: 2013
Limits	:	< 1 Watt (Maximum Conducted Peak Power) e.i.r.p. <4W
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2021-01-04
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.3 ℃
Relative humidity	:	52 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 5: Test Result of Maximum Peak Conducted Output Power,

Channel	Channel Frequency (MHz)	Peak Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2402	6.0	0.00398	1
Middle Channel	2440	6.8	0.00479	1
High Channel	2480	7.1	0.00513	1

Note: The cable loss is taken into account in results and the e.i.r.p. is 8.95 dBm less than 4W (36 dBm).

5.1.3 Conducted Power Spectral Density

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(e) RSS-247 Clause 5.2(b)
Basic standard	:	ANSI C63.10: 2013
Limits	:	8 dBm / 3kHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2021-01-04
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 ℃
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

Table 6: Test Result of Power Spectral Density

Channel	Channel Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
Low Channel	2402	4.36	8
Middle Channel	2440	5.16	8
High Channel	2480	5.42	8

Note: The cable loss is taken into account in results.

For the measurement records, refer to the appendix B.

5.1.4 99%dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	RSS-Gen clause 6.7
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2021-01-04
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 ℃
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Table 7: Test Result of 99% Bandwidth

Channel	Channel Frequency (MHz)	99% Bandwidth (kHz)	Limit (MHz)	Result
Low Channel	2402	1030	/	Pass
Mid Channel	2440	1030	/	Pass
High Channel	2480	1035	/	Pass

For the measurement records, refer to the appendix B.

5.1.5 6dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(a)(2) RSS-247 Clause 5.2(a)
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2021-01-04
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 ℃
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Table 8: Test Result of 6dB Bandwidth

Channel	Channel Frequency (MHz)	-6dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2402	693.070	500	Pass
Mid Channel	2440	693.070	500	Pass
High Channel	2480	712.872	500	Pass

For the measurement records, refer to the appendix B.

5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d) RSS-247 Clause 5.5
Basic standard	:	ANSI C63.10: 2013
Limits	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2021-01-04
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 ℃
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix B.

5.1.7 Radiated Spurious Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d) & FCC Part 15.205 RSS-247 Clause 3.3 & 5.5
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Table 4 & Table 5
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2021-01-07 – 2021-01-12
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	22℃
Relative humidity	:	50 %
Atmospheric pressure	:	101 kPa

Remark:
Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix B.

5.1.8 Conducted Emission on AC Mains

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.207(a) RSS-Gen Clause 8.8
Basic standard	:	ANSI C63.10: 2013
Frequency range	:	0.15 – 30MHz
Limits	:	FCC Part 15.207(a) RSS-Gen Table 4
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2021-01-15
Input voltage	:	AC 120V/60Hz
Operation mode	:	B
Earthing	:	Not connected
Ambient temperature	:	24.3 ℃
Relative humidity	:	52 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

6 Safety Human Exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT: **Pass**

Test Specification

Test standard	:	CFR47 FCC Part 2.1091
		RSS-102 Issue 5 March 2015
		FCC KDB Publication 447498 v06
Limit	:	CFR47 FCC Part 1.1310

FCC requirement: Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20cm normally can be maintained between the user and the device.

MPE Calculation Method according to OET Bulletin 65

Power Density: $S_{(mW/cm^2)}= PG/4\pi R^2$ or $EIRP/4\pi R^2$

Where:

S = power density (mW/cm^2)

P = power input to the antenna (mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm)

The nominal maximum conducted output power specified:

BLE: 7.10 dBm

From the peak RF output power, the minimum mobile separation distance, d=20 cm, as well as the antenna gain (1.85 dBi), the RF power density can be calculated as below:

Fo BLE: $\mathbf{S_{(mW/cm^2)}= PG/4\pi R^2 =}$ 0.002 mW/cm^2

Limits for Maximum Permissible Exposure (MPE) according to FCC Part 1.1310: 1.0 mW/cm2

- **IC requirements:** The EUT shall comply with the requirement of RSS-102 section 2.5.2.

Exemption from Routine Evaluation Limits – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2}\ f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

- RF exposure evaluation exempted power for 2.4G DTS: 2.676 W

The nominal maximum conducted output power specified:

BLE: 7.10 dBm

Antenna Gain: 1.85 dBi

The Max. e.i.r.p. for BLE: 8.95dBm = 0.008 W

The e.i.r.p. of BLE is less than the RF exposure evaluation exempted power. So RF exposure evaluation is not required.

"RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons."

7 Photographs of the Test Set-Up

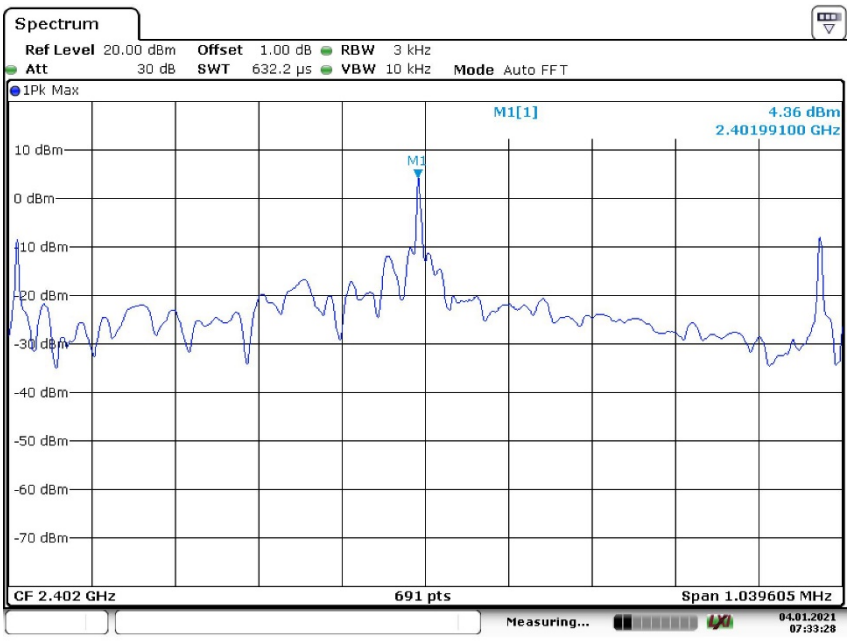
For photographs of the test set-up, refer to the appendix A.

8 List of Tables

Appendix B: Test Results

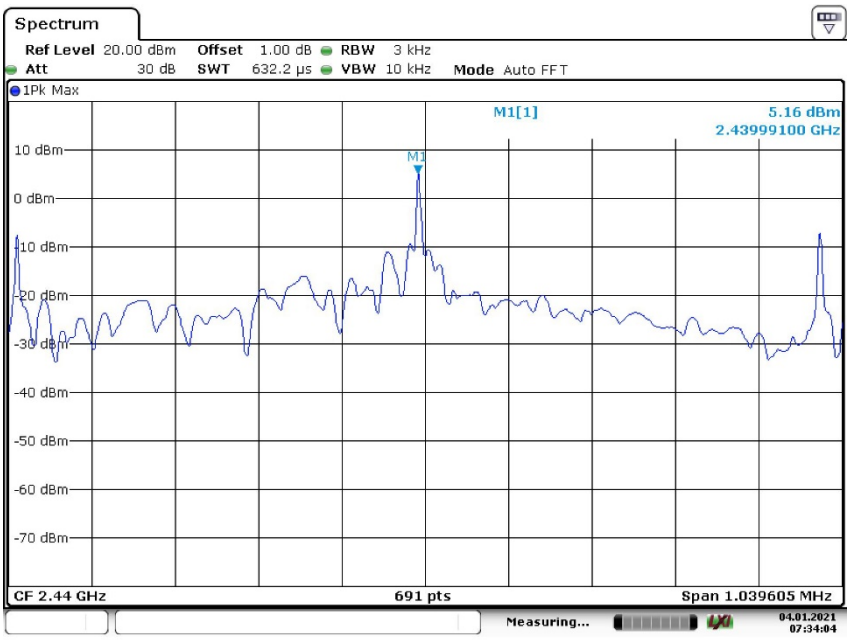
Appendix B.1: Conducted Power Spectral Density

Low Channel



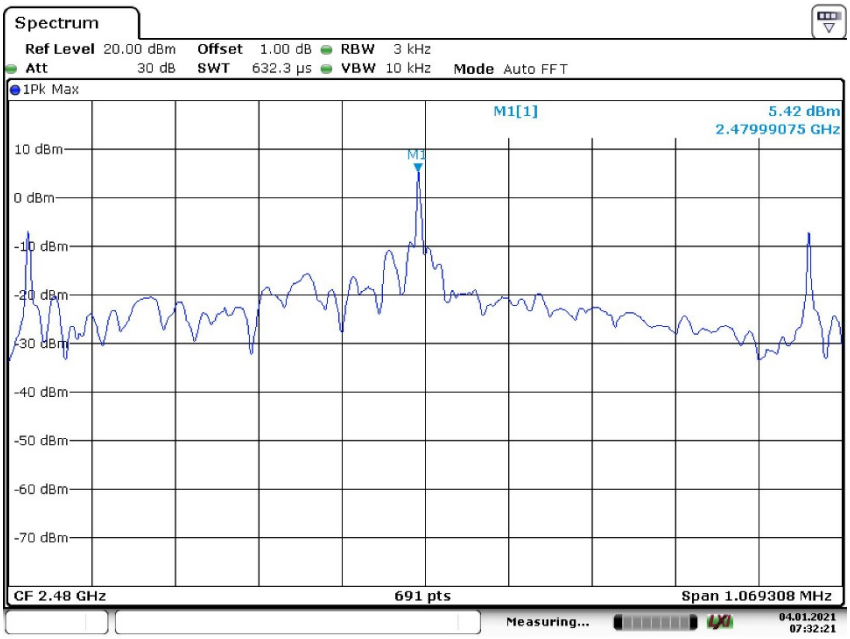
Date: 4.JAN.2021 07:33:28

Middle Channel



Date: 4.JAN.2021 07:34:04

High Channel

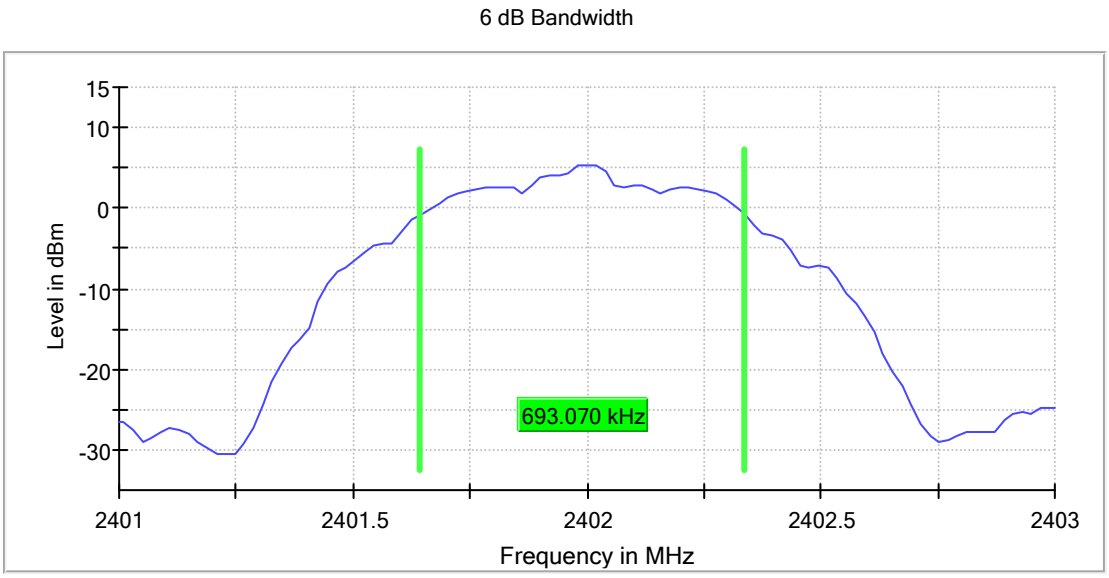


Date: 4.JAN.2021 07:32:21

Appendix B.2: 6dB Bandwidth

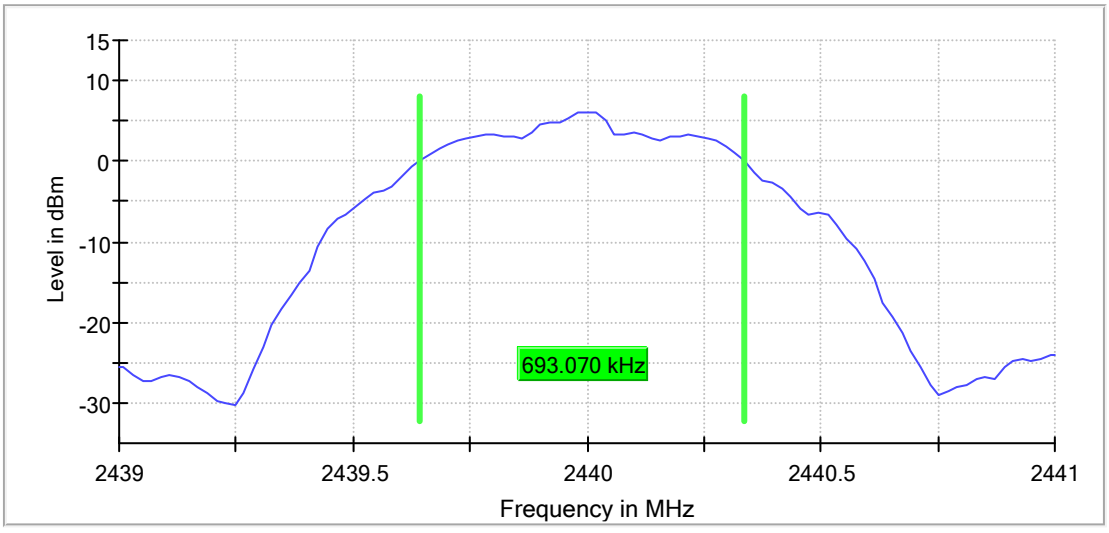
Low Channel

RBW=100KHz, VBW=300KHz



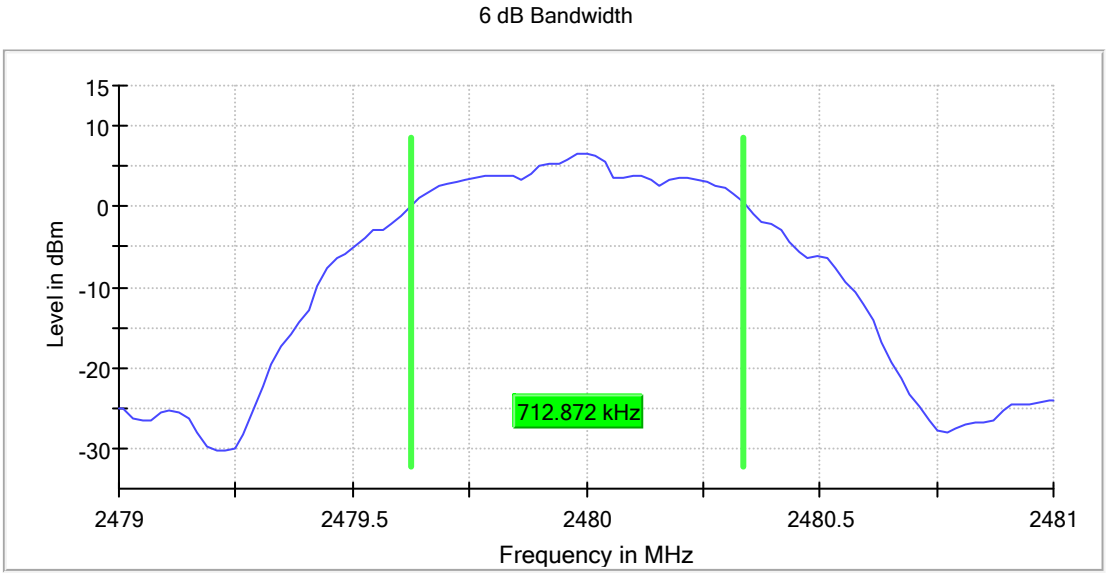
Middle Channel

RBW=100KHz, VBW=300KHz



High Channel

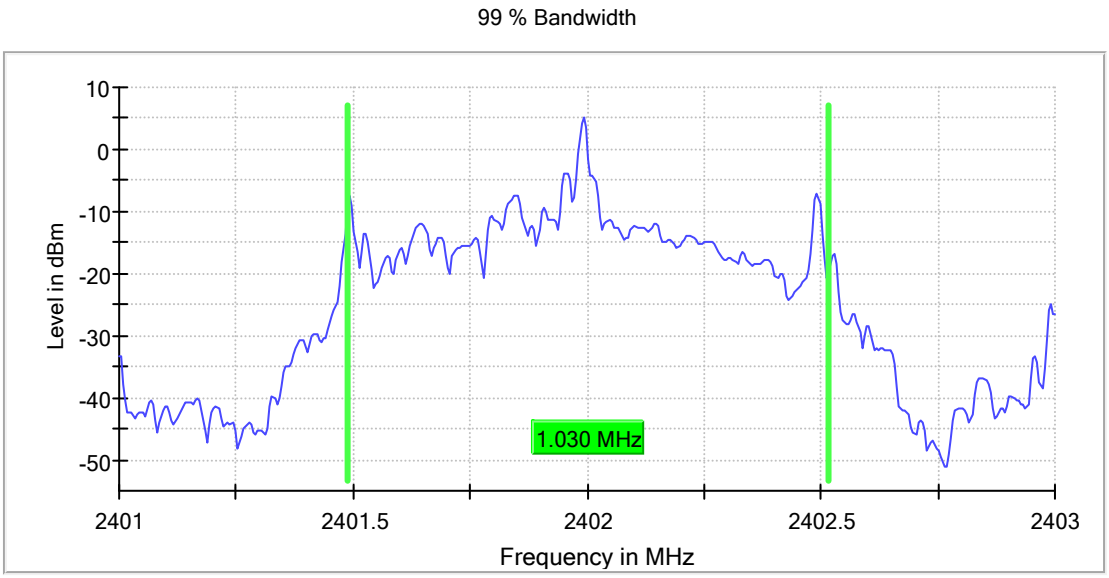
RBW=100KHz, VBW=300KHz



Appendix B.3: 99% Bandwidth

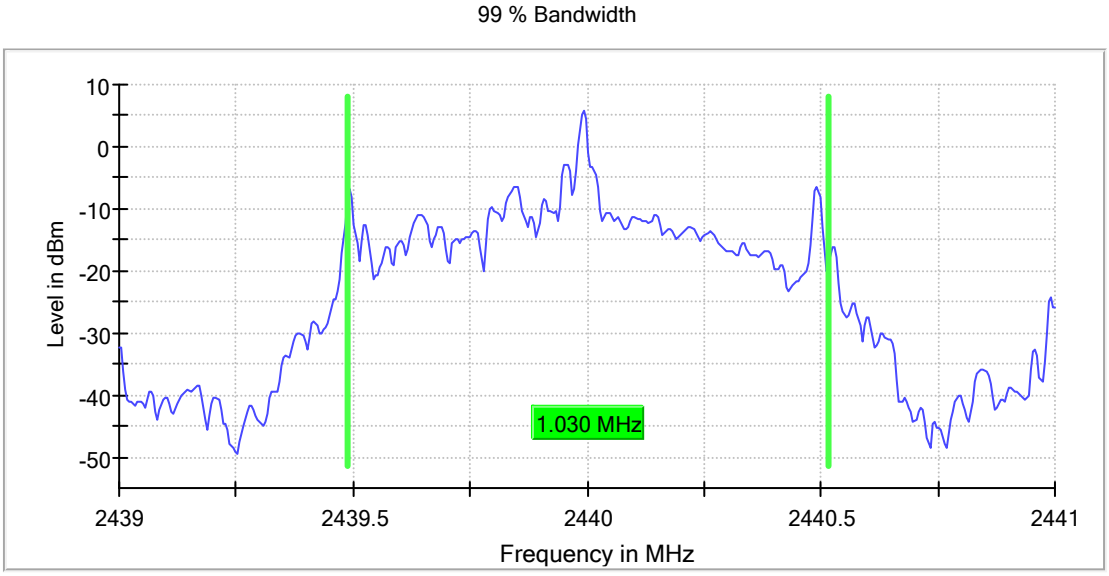
Low Channel

RBW=50KHz, VBW=200KHz



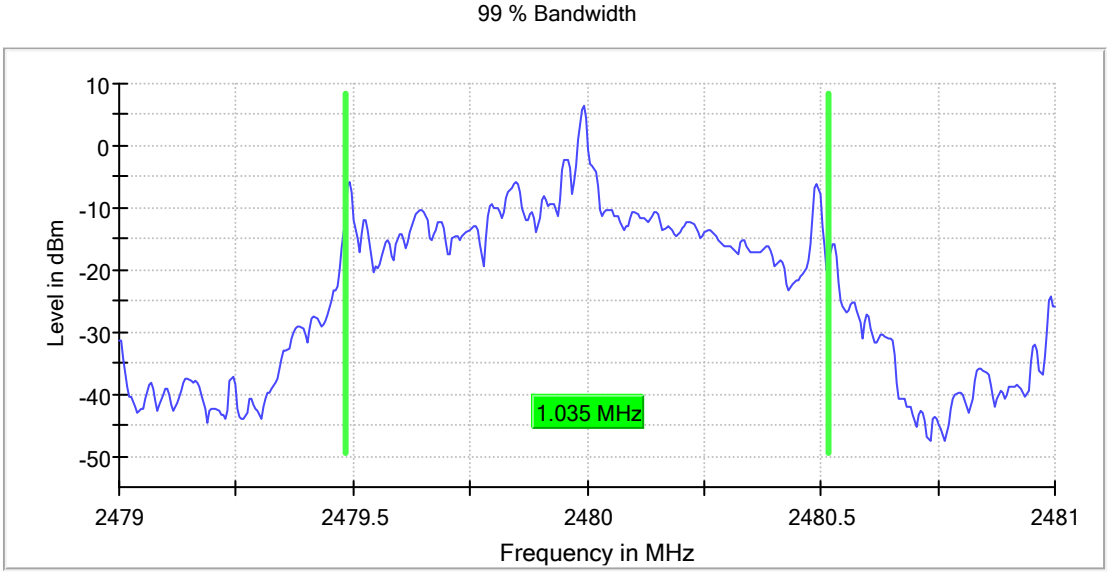
Middle Channel

RBW=50KHz, VBW=200KHz



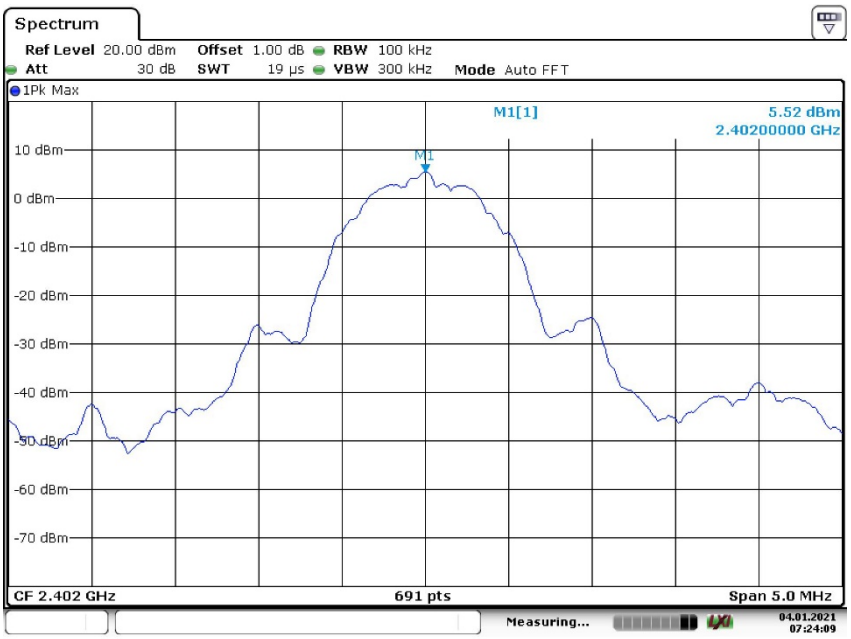
High Channel

RBW=50KHz, VBW=200KHz

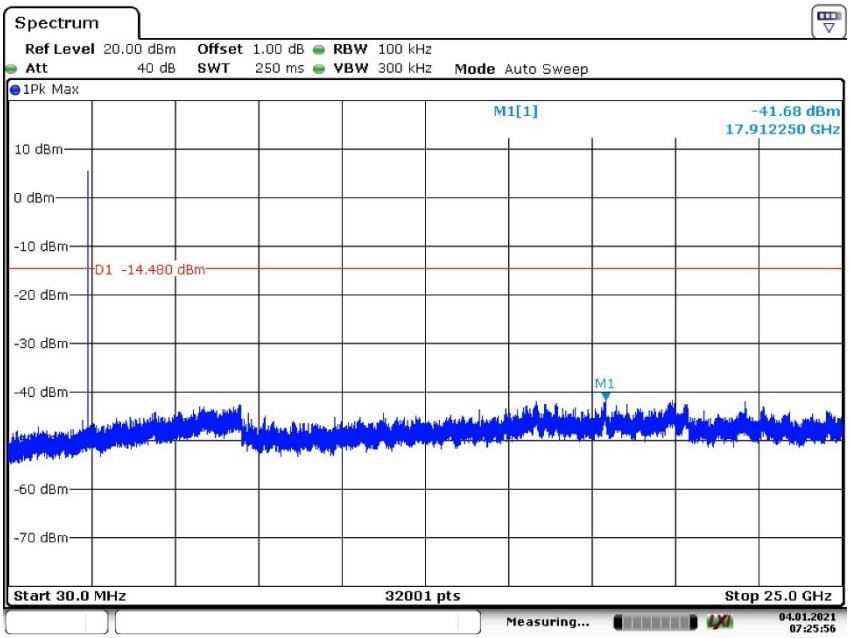


Appendix B.4: Conducted Spurious Emissions Measured in 100 kHz Bandwidth

Low Channel

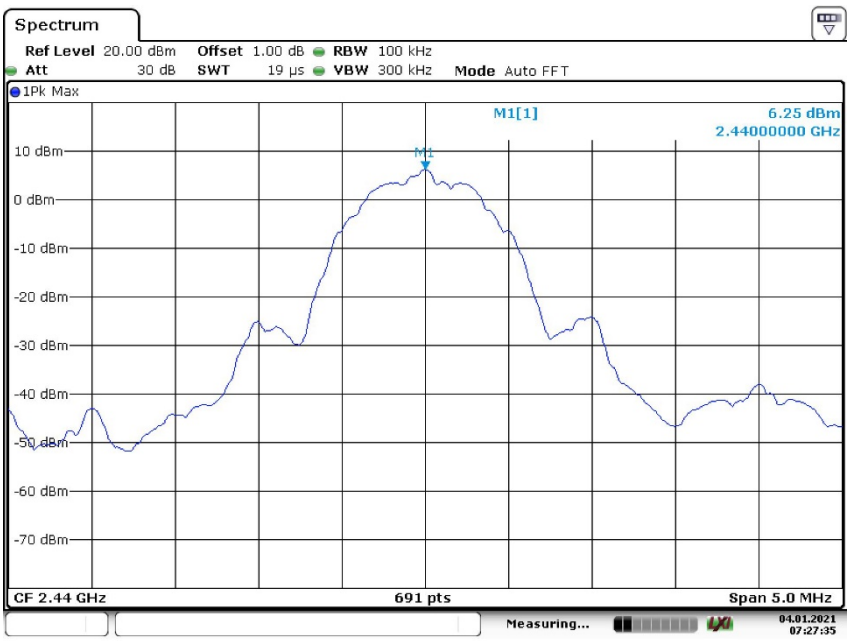


Date: 4.JAN.2021 07:24:09

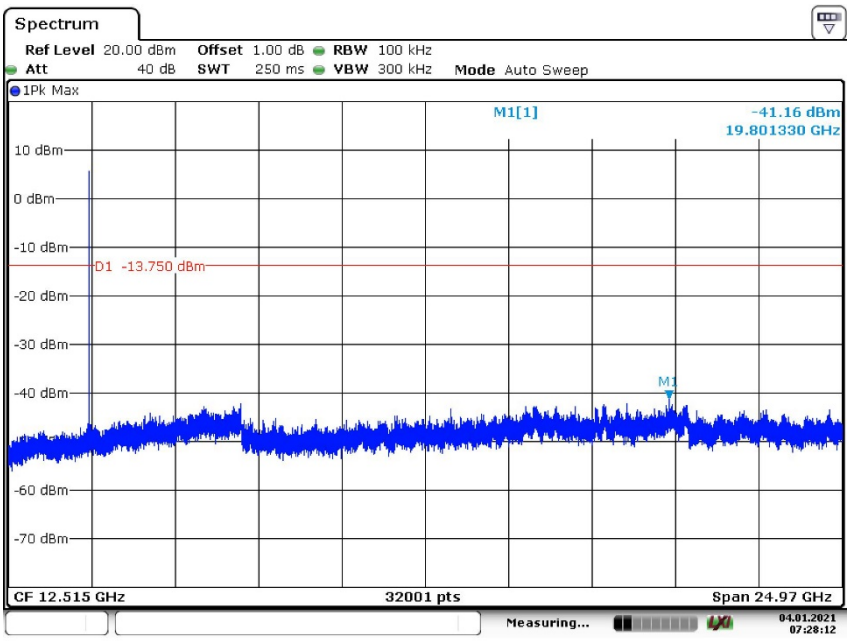


Date: 4.JAN.2021 07:25:56

Middle Channel

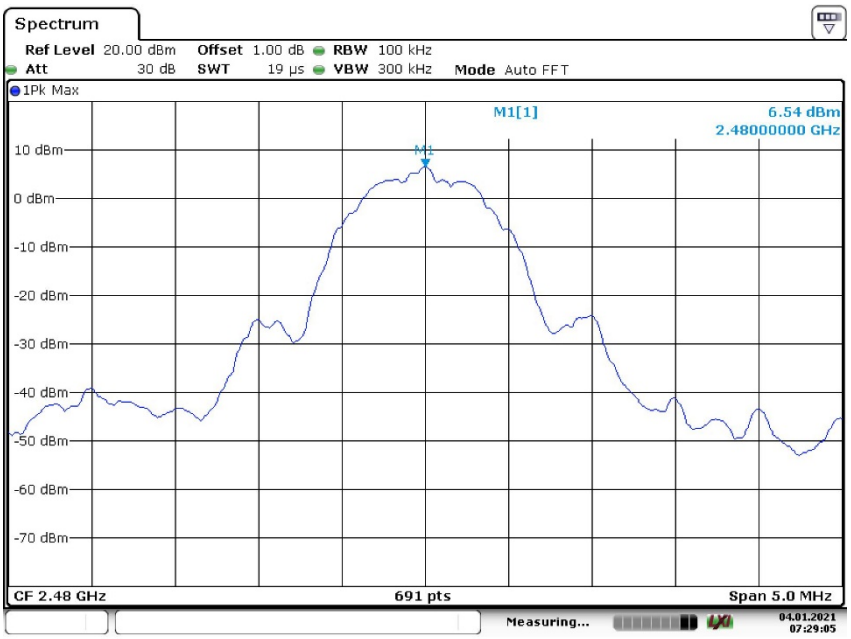


Date: 4.JAN.2021 07:27:35

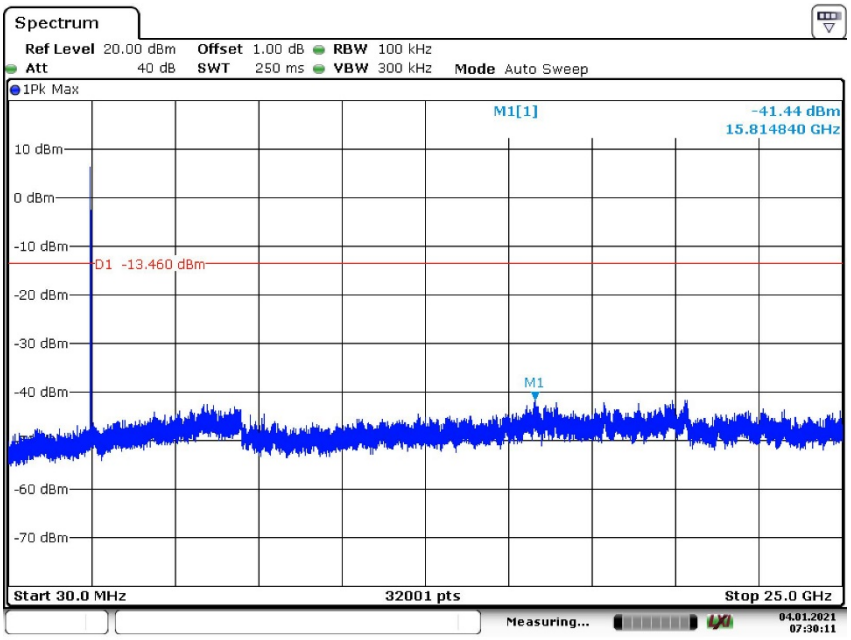


Date: 4.JAN.2021 07:28:12

High Channel

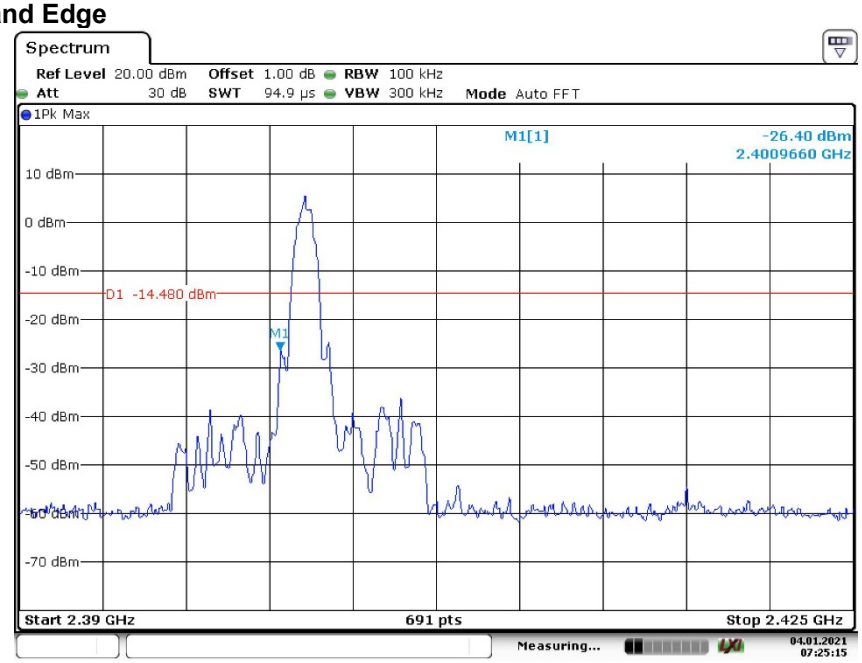


Date: 4.JAN.2021 07:29:05



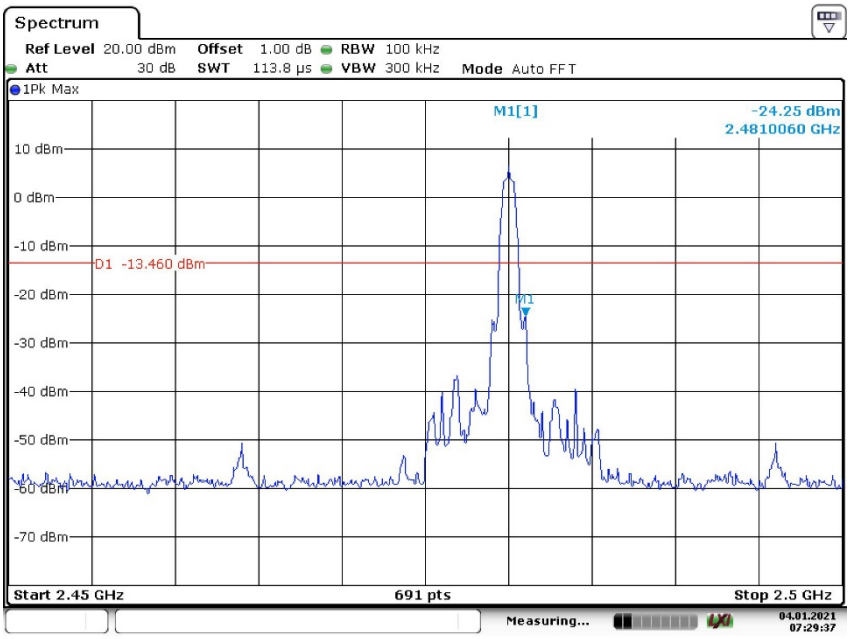
Date: 4.JAN.2021 07:30:11

Low Channel_Band Edge



Date: 4.JAN.2021 07:25:15

High Channel_Band Edge



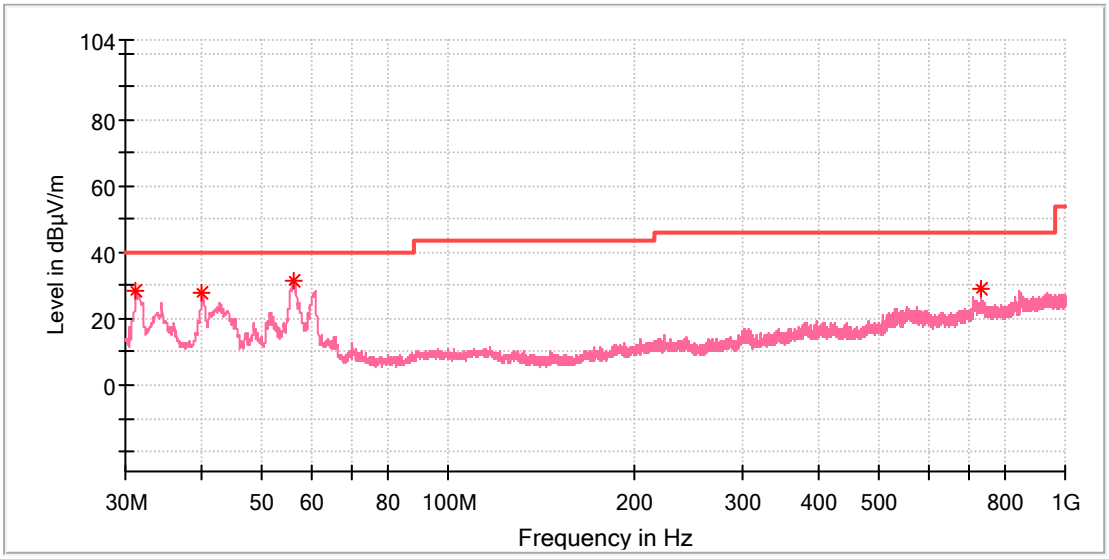
Date: 4.JAN.2021 07:29:37

Appendix B.5: Test Results of Radiated Spurious Emissions

Note 1: Testing was carried out within frequency range 9 kHz to the tenth harmonics. The measurement results below 30MHz and above 18GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Low CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

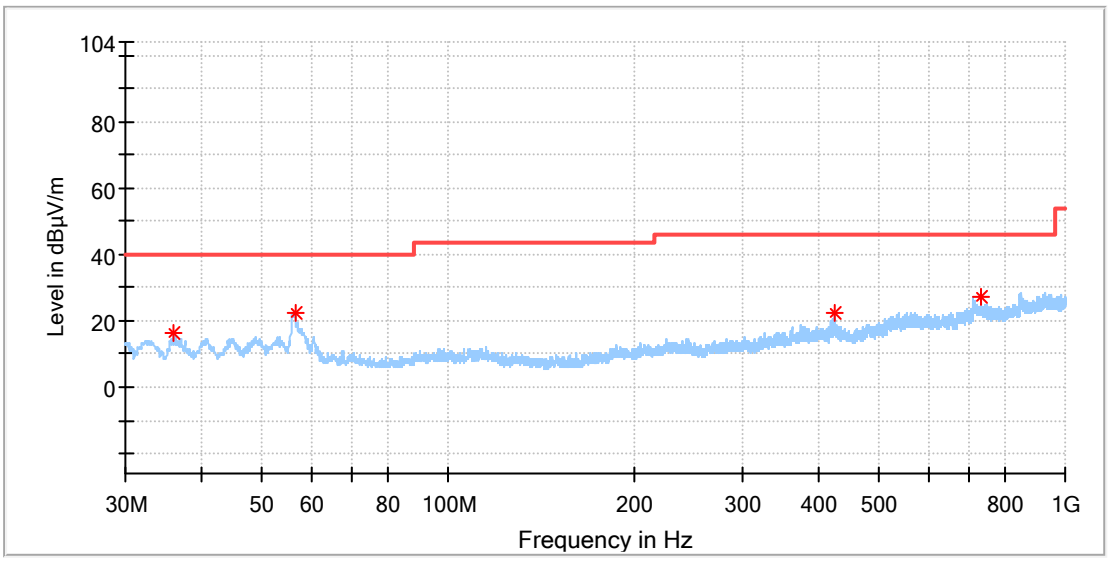


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.212500	28.19	---	40.00	11.81	100.0	V	276.0	-23.1
39.942500	27.82	---	40.00	12.18	100.0	V	120.0	-20.4
56.190000	31.66	---	40.00	8.34	100.0	V	178.0	-18.9
729.467000	28.82	---	46.00	17.18	100.0	V	3.0	-7.9

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Low CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

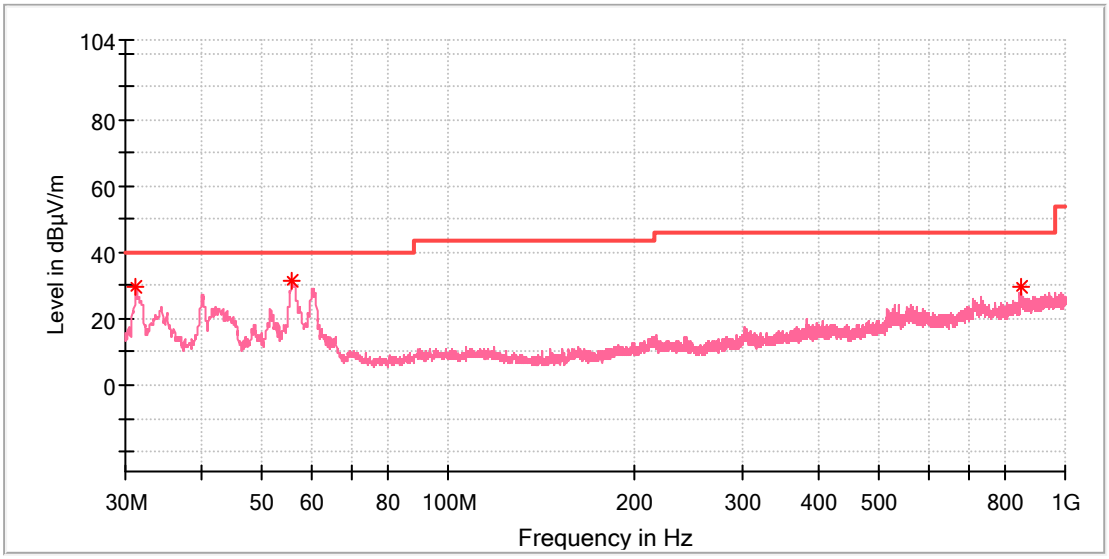


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
35.965500	16.09	---	40.00	23.91	100.0	H	235.0	-21.9
56.481000	22.65	---	40.00	17.35	100.0	H	0.0	-18.9
424.014000	22.47	---	46.00	23.53	100.0	H	93.0	-13.7
730.000500	27.34	---	46.00	18.66	100.0	H	115.0	-7.9

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_High CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

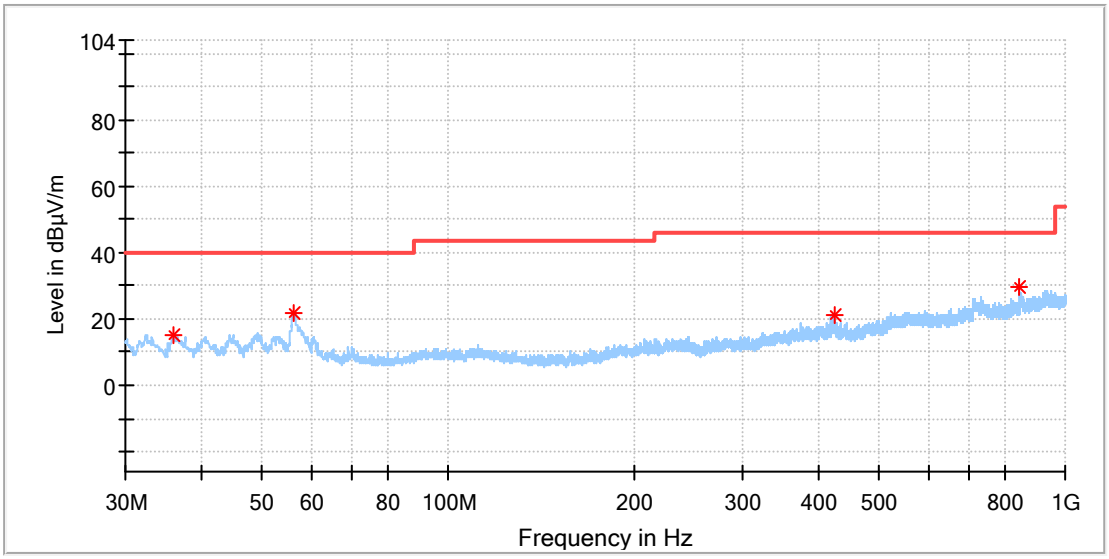


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.212500	29.48	---	40.00	10.52	100.0	V	213.0	-23.1
55.899000	31.40	---	40.00	8.60	100.0	V	13.0	-18.8
845.236500	29.65	---	46.00	16.35	100.0	V	279.0	-6.0

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_High CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

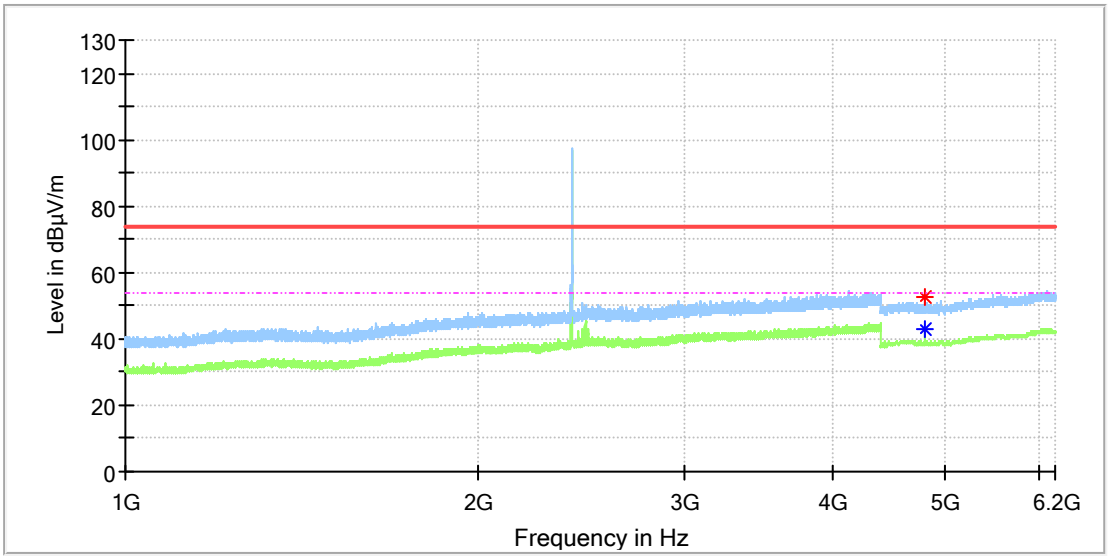


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
35.917000	15.32	---	40.00	24.68	100.0	H	19.0	-21.9
56.141500	21.93	---	40.00	18.07	100.0	H	149.0	-18.9
423.965500	21.02	---	46.00	24.98	100.0	H	324.0	-13.7
844.848500	29.93	---	46.00	16.07	100.0	H	0.0	-6.0

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Low CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

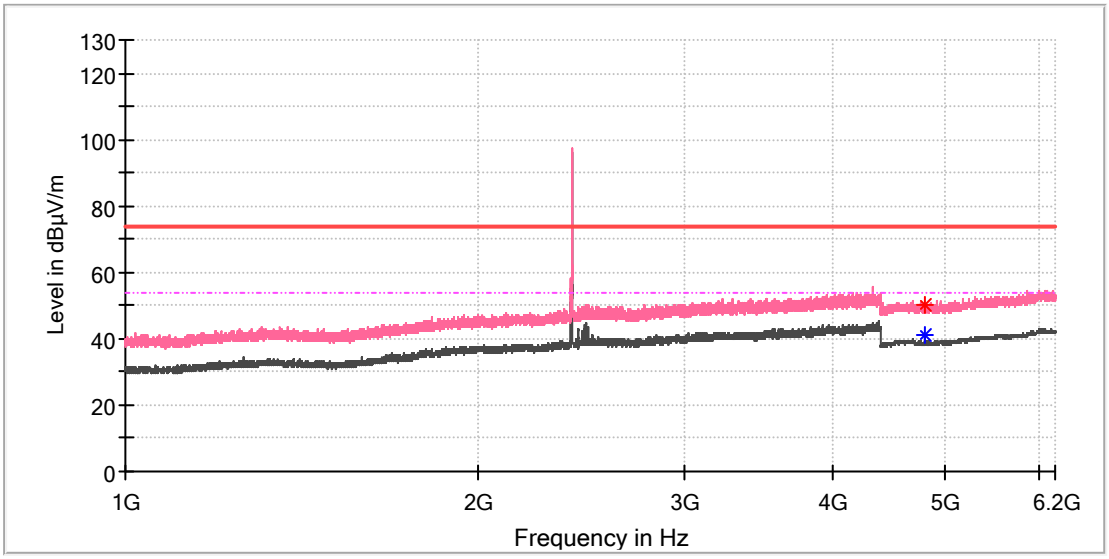


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4803.500000	---	42.93	54.00	11.07	100.0	H	1.0	11.8
4804.000000	52.61	---	74.00	21.39	100.0	H	340.0	11.8

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Low CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

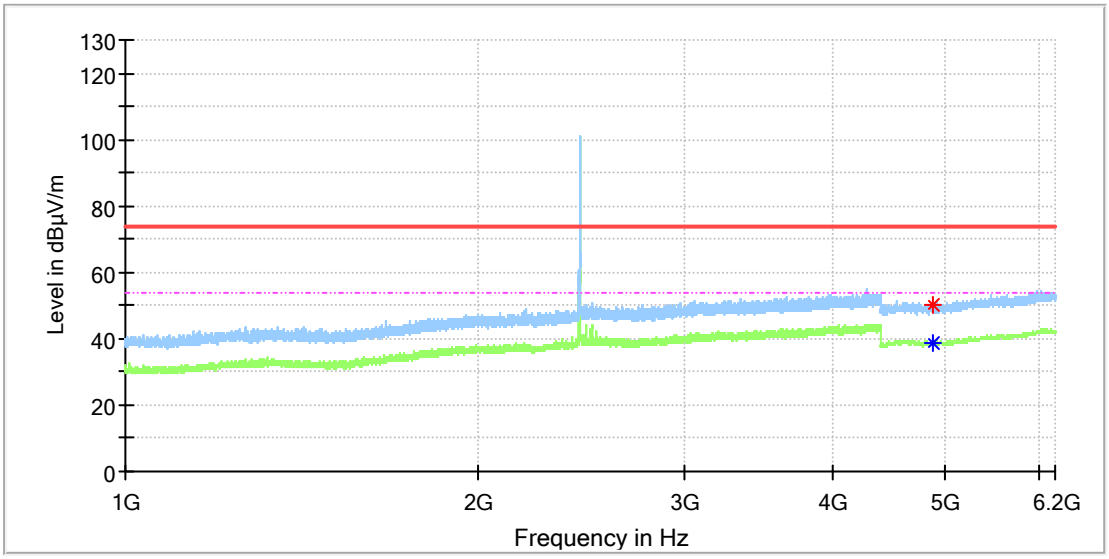


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4804.000000	---	40.85	54.00	13.15	100.0	V	310.0	11.8
4804.500000	50.10	---	74.00	23.90	100.0	V	294.0	11.8

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Mid CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

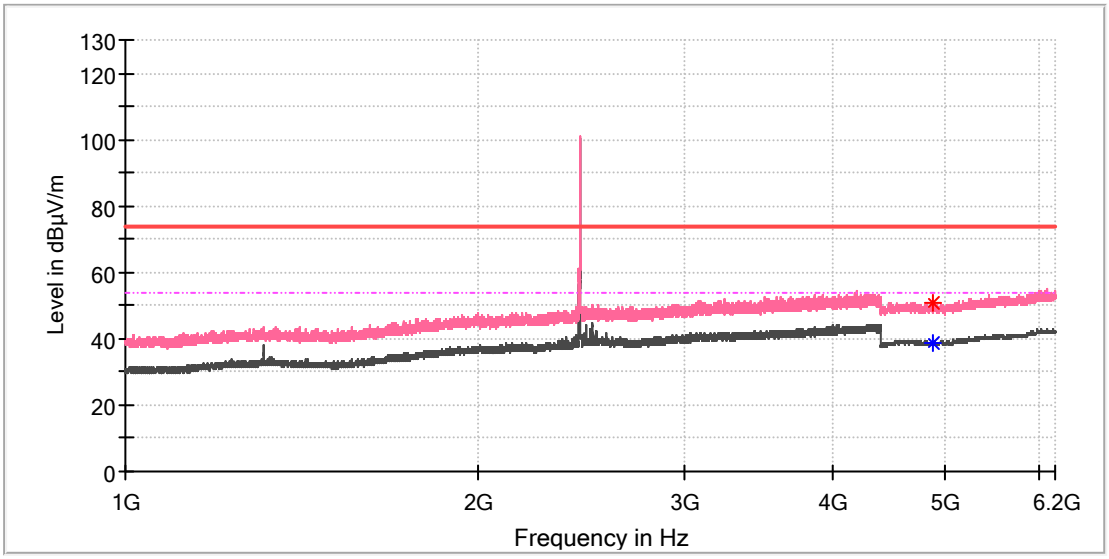


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4880.000000	---	38.73	54.00	15.27	100.0	H	233.0	11.8
4881.000000	49.99	---	74.00	24.01	100.0	H	152.0	11.8

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Mid CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

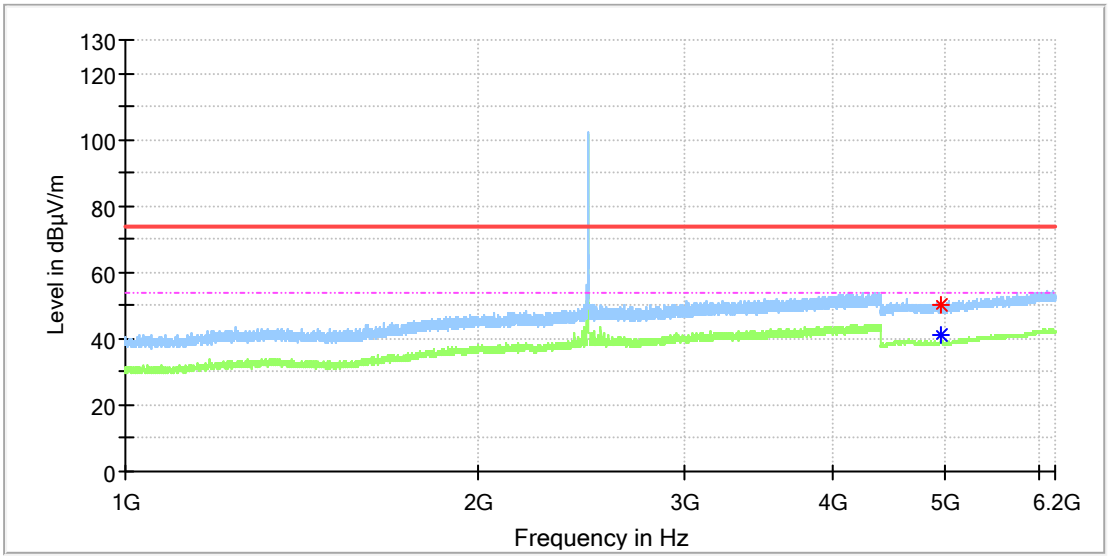


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4878.000000	50.68	---	74.00	23.32	100.0	V	73.0	11.8
4880.500000	---	38.73	54.00	15.27	100.0	V	89.0	11.8

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_High CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

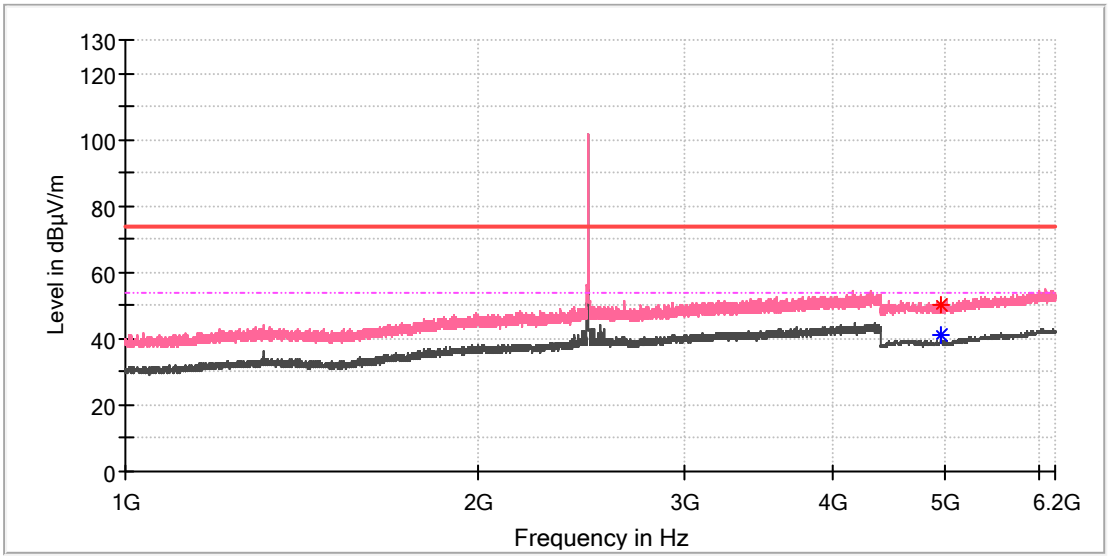


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4956.500000	50.29	---	74.00	23.71	100.0	H	76.0	11.8
4960.500000	---	41.12	54.00	12.88	100.0	H	190.0	11.8

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_High CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

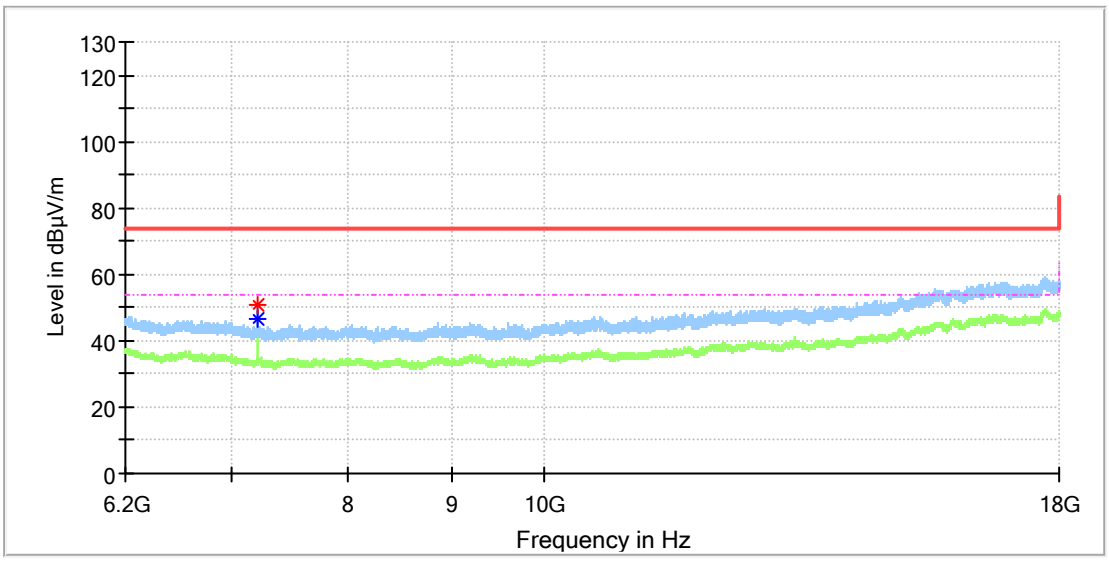


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4960.000000	50.04	---	74.00	23.96	100.0	V	315.0	11.8
4960.000000	---	40.84	54.00	13.16	100.0	V	315.0	11.8

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Low CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

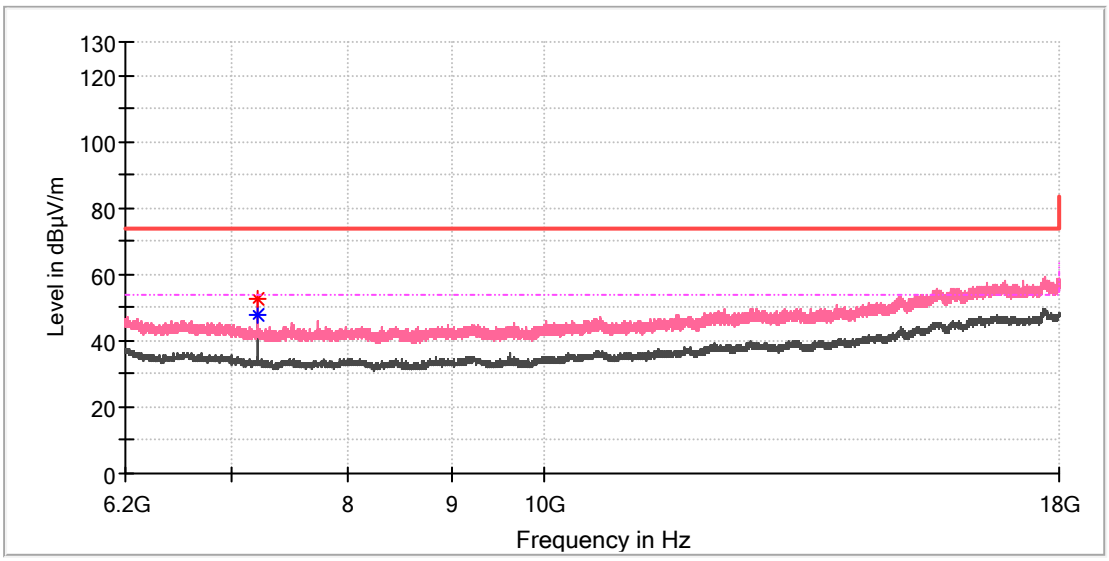


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7205.458333	---	46.39	54.00	7.61	100.0	H	354.0	8.8
7206.933333	50.96	---	74.00	23.04	100.0	H	315.0	8.8

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Low CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

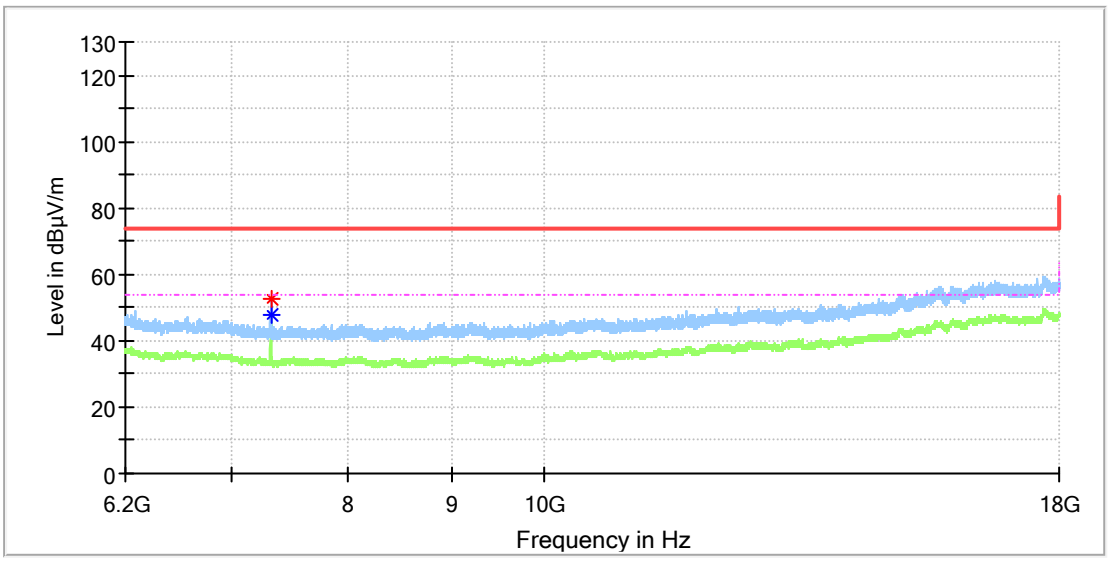


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7205.458333	---	47.86	54.00	6.14	100.0	V	113.0	8.8
7206.933333	52.83	---	74.00	21.17	100.0	V	198.0	8.8

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Mid CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

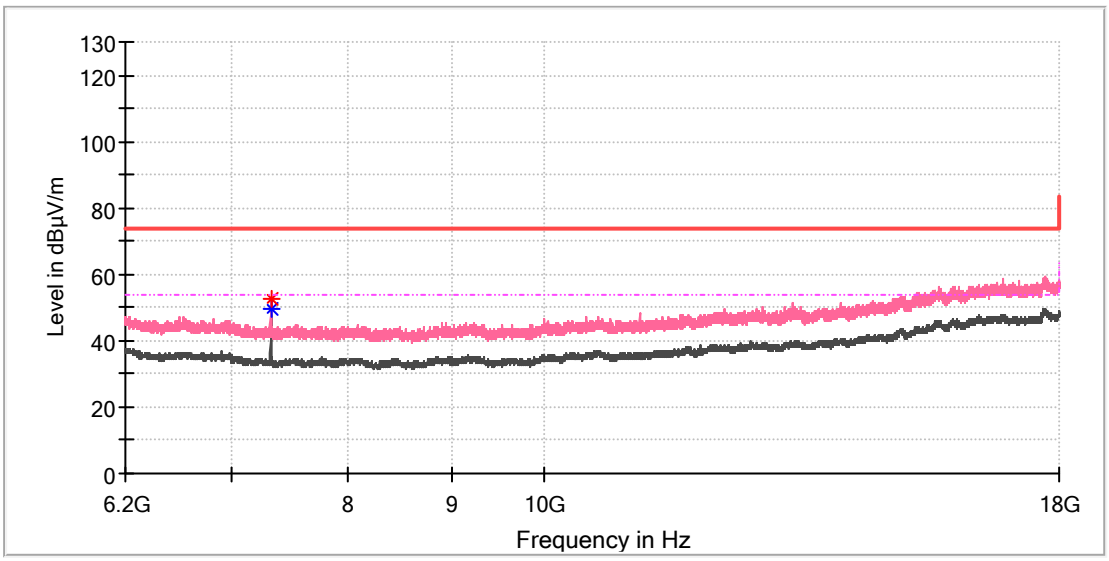


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7320.508333	52.61	---	74.00	21.39	100.0	H	250.0	8.2
7320.508333	---	47.76	54.00	6.24	100.0	H	250.0	8.2

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Mid CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

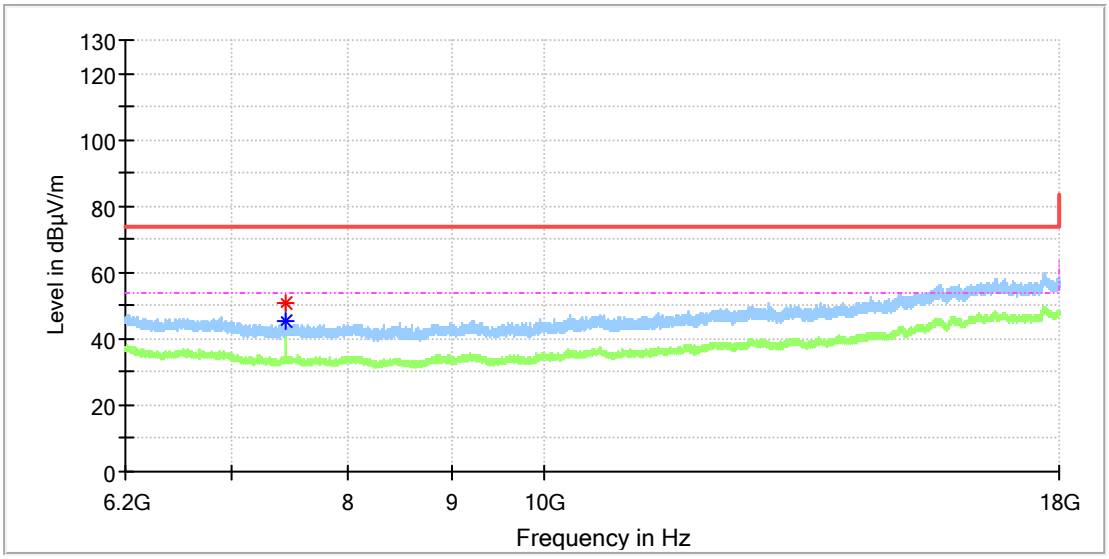


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7320.016667	52.41	---	74.00	21.59	100.0	V	81.0	8.2
7320.016667	---	49.59	54.00	4.41	100.0	V	81.0	8.2

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_High CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

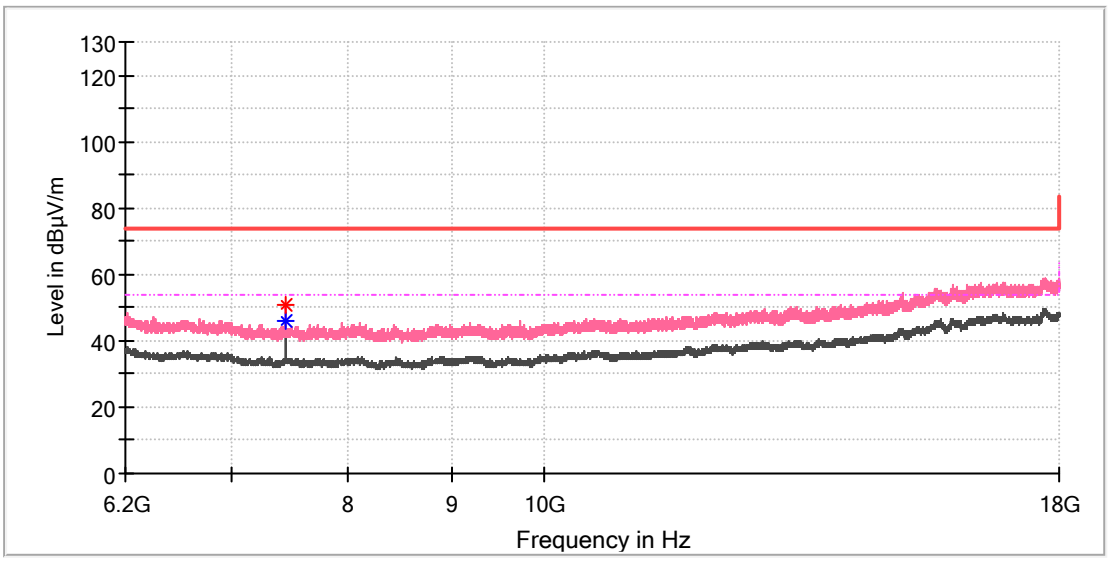


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7439.000000	50.77	---	74.00	23.23	100.0	H	206.0	8.4
7439.983333	---	45.23	54.00	8.77	100.0	H	206.0	8.4

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_High CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



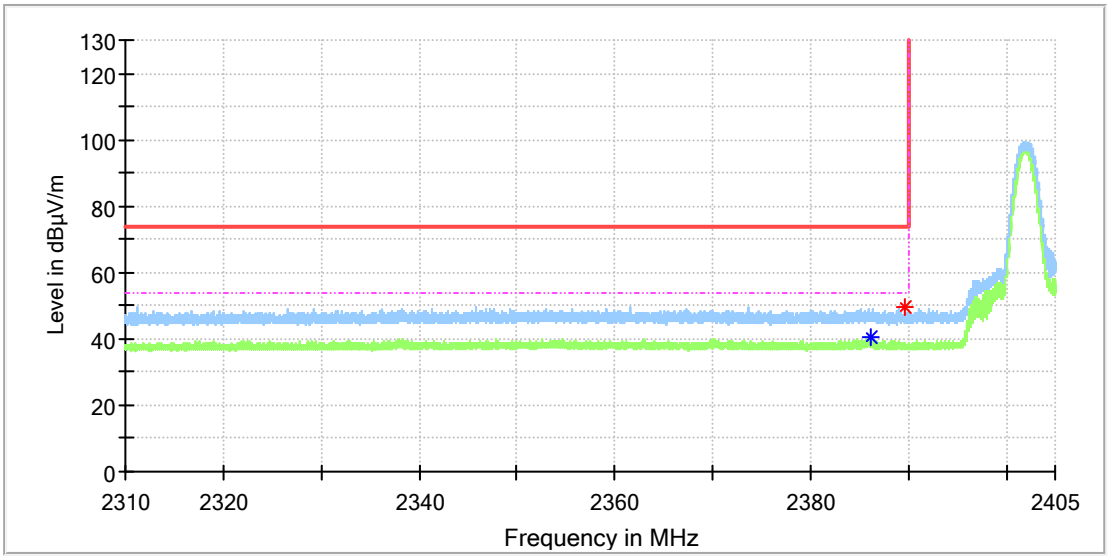
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7439.491667	50.62	---	74.00	23.38	100.0	V	230.0	8.4
7439.491667	---	45.89	54.00	8.11	100.0	V	230.0	8.4

Appendix B.6: Test Results of Radiated Emissions in Restricted Bands

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Low CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

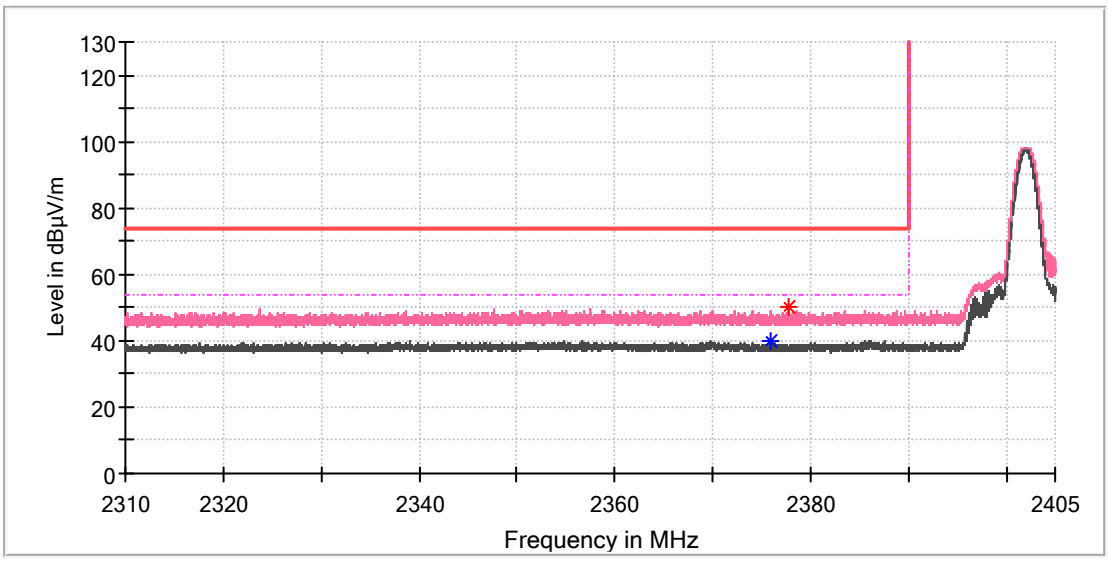


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2386.177500	---	40.30	54.00	13.70	100.0	H	257.0	7.0
2389.684500	49.34	---	74.00	24.67	100.0	H	19.0	7.0

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_Low CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

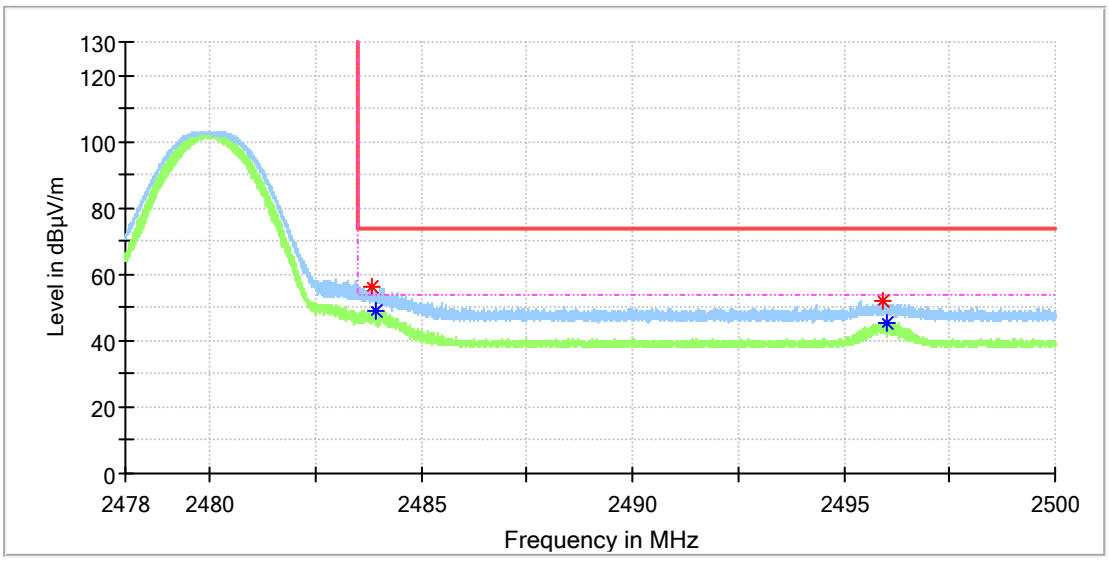


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2375.934750	---	39.80	54.00	14.20	100.0	V	191.0	6.9
2377.735500	50.16	---	74.00	23.84	100.0	V	180.0	6.9

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_High CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin

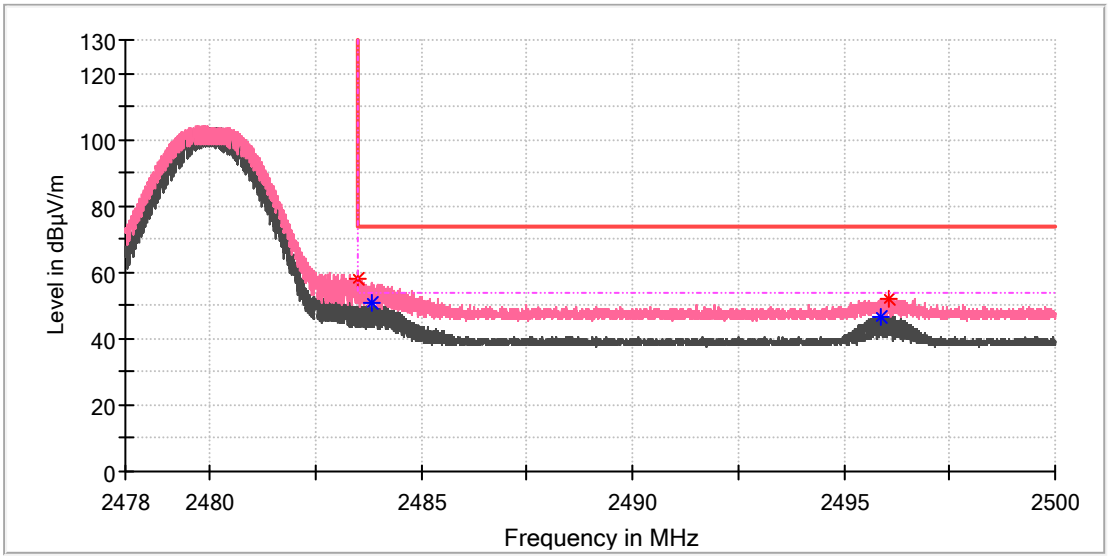


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.809600	56.26	---	74.00	17.74	100.0	H	193.0	7.4
2483.931200	---	49.02	54.00	4.98	100.0	H	193.0	7.4
2495.899200	51.87	---	74.00	22.13	100.0	H	193.0	7.4
2496.033600	---	45.51	54.00	8.49	100.0	H	193.0	7.4

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	TX_BLE_High CH
Test Voltage::	AC 120V, 60Hz
Remark:	Temp 22 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Alano Qu
Reviewed By:	Terry Yin



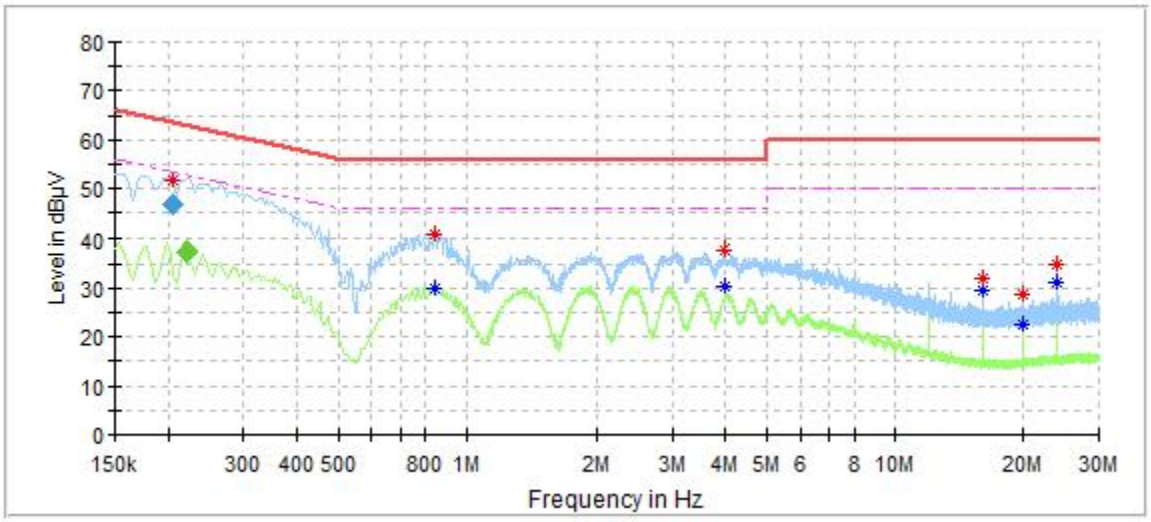
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.516800	57.96	---	74.00	16.04	100.0	V	70.0	7.4
2483.843200	---	50.64	54.00	3.36	100.0	V	70.0	7.4
2495.865600	---	46.71	54.00	7.29	100.0	V	70.0	7.4
2496.062400	51.96	---	74.00	22.04	100.0	V	84.0	7.4

Appendix B.7: Test Results of Conducted Emissions on AC Mains

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	Full Load
Test Voltage:	AC 120V/60Hz
Test By:	Shower.Dai
Review By:	Gary Chen
Remark:	Main



Critical_Freqs

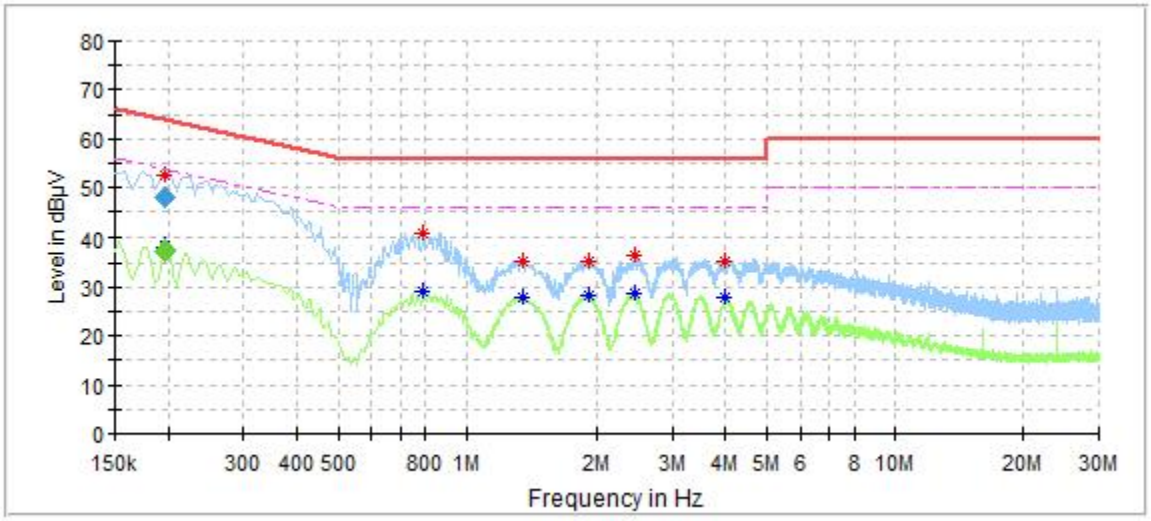
Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.204500	51.64	---	62.90	11.25	L1	9.6
0.220500	---	37.77	52.90	15.13	L1	9.6
0.840000	---	29.96	46.00	16.04	L1	9.7
0.840000	40.67	---	56.00	15.33	L1	9.7
4.000000	---	30.33	46.00	15.67	L1	9.8
4.000000	37.63	---	56.00	18.37	L1	9.8
16.000000	---	29.35	50.00	20.65	L1	10.3
16.000000	32.13	---	60.00	27.87	L1	10.3
20.000000	---	22.71	50.00	27.29	L1	10.5
20.000000	28.83	---	60.00	31.17	L1	10.5
24.000000	---	31.38	50.00	18.62	L1	10.5
24.000000	34.71	---	60.00	25.29	L1	10.5

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.204500	46.71	---	63.43	16.72	200.0	9.000	L1	9.6
0.220500	---	37.25	52.80	15.55	200.0	9.000	L1	9.6

EUT Information

EUT Name:	In-Wall Smart Switch
Model:	HIWMAS1BLE40AWH
Test Mode:	Full Load
Test Voltage:	AC 120V/60Hz
Test By:	Shower.Dai
Review By:	Gary Chen
Remark:	Main



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.196500	---	38.19	53.69	15.51	N	9.6
0.196500	52.61	---	63.69	11.09	N	9.6
0.792000	40.54	---	56.00	15.46	N	9.7
0.792000	---	29.02	46.00	16.98	N	9.7
1.360000	35.14	---	56.00	20.86	N	9.7
1.360000	---	27.91	46.00	18.09	N	9.7
1.908000	---	28.48	46.00	17.52	N	9.7
1.908000	35.12	---	56.00	20.88	N	9.7
2.456000	---	28.69	46.00	17.31	N	9.8
2.460000	36.46	---	56.00	19.54	N	9.8
4.000000	35.24	---	56.00	20.76	N	9.8
4.008000	---	28.03	46.00	17.97	N	9.8

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.196500	---	37.31	53.76	16.45	200.0	9.000	N	9.6
0.196500	47.95	---	63.76	15.81	200.0	9.000	N	9.6